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Magnolia grandiflora 'St. Mary'

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THE ASSOCIATES, through whose interest and generosity *The Bulletin* and certain other undertakings of the Arboretum are made possible, is an informal group of individuals interested in encouraging and furthering the educational and research endeavors of the Morris Arboretum.

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Arboretum Activities

THE STAFF

On Thursday, March 23, the Director gave the Five O'Clock lecture at the Philadelphia Art Alliance. His topic was "Spring in Philadelphia" and his talk was illustrated principally with colored pictures taken in the Arboretum. On April 27 he spoke to the Philadelphia Botanical Club on "Magnolias".

Dr. Li participated in the One Hundred and Seventy-first meeting of the American Oriental Society held in Philadelphia, March 28-30. His paper was entitled "Chinese record of pre-

Columbian transatlantic travel by Arabian ships, with notes on the dispersion of some cultivated plants." He spoke on the same topic at the annual meeting of the Society for Economic Botany which was held in Cambridge, Mass., on May 11.

On May 6, Dr. Allison spoke at the Hawk Mountain Bird Sanctuary on the subject "Stump Stalking" and on May 20 she appeared on the television program "Concept" where she discussed some of the problems of Plant Pathology.

(Continued on Page 19)

Variations in *Magnolia Grandiflora*

H. HAROLD HUME¹

Magnolia grandiflora L. is a broad-leaved evergreen tree native in the United States from Florida north to eastern North Carolina and westward from Florida into Texas. In Florida it extends southward to a line drawn through and from the county of Manatee across Highlands County to the vicinity of Sebastian on the East Coast. Nowhere does it grow far inland from the Atlantic Ocean or the Gulf of Mexico.

It is a noteworthy tree, not likely, even by the uninitiated, to be mistaken for any other growing naturally within the same region. In its densely foliated head, clothed with large, rigid leaves, lustrous on the upper surface, it is distinct. It reaches maximum growth on soils naturally fertile and provided with good supplies of moisture, but at the same time with good drainage. It may reach a height of nearly 100 feet with a trunk diameter to 3 feet or more but usually it is found at a height of 60 feet or so. Its bark is grayish in color, free from furrows, somewhat roughened. The heart wood of old or very old trees is very dark, almost black, glistening. Newer wood is creamy white. Its flowers are borne singly at the tips of the twigs, large waxy-white, sweet scented, last for two days, beginning along latitude 30° N. in May. They are cup-shaped on the first day of opening. On the second day the anthers are shed, and mixed with pollen, are held by the saucer-like circle of petals. The aggregate, cone-like fruits mature in September when the red-coated seeds are protruded and hang for a time by slender thread-like filaments.

It is to be expected that a tree with a distribution so extended north and south, east and west, will show variations. This is true for *M. grandiflora*. There are noteworthy differences. This is so true that it is not too much to say that all seedling specimens differ in certain particulars from one another. A considerable number, all chance seedlings, have been selected, named and propagated, mostly in Europe.

The outline of the tree head may be irregularly round, conical or columnar. Usually they are compactly branched but trees can be found with heads fairly open with more widely separated

branches, resulting in trees of quite different appearance.

Leaves vary in shape, size and undersurfaces. The blades are always rigid, usually obovate in shape but they may be almost round and mostly 4 to 10 inches long. A few specimens are known with leaves more than 13 inches in length. Those with small leaves (4 to 6 inches) present very compact heads because the leaves are commonly spaced closely together. Coloring of the leaf undersurfaces varies on different trees. In botanical texts the undersurface is often described as being tomentose, the tomentum colored like iron rust. Yet there are specimens without any sign of tomentum and others with gray-green tomentum. It is probably not too much to say that there are more magnolias with leaves green-gray on undersurfaces than there are with rust-colored ones. Trees along highway A1A between St. Augustine and Ponte Vedra, Florida are noteworthy for their rusty leaves. Coloring is of some importance for, when the branches and leaves are tossed by the wind a different appearance is imparted to the tree. Usually the upper surfaces of the leaves are quite smooth but here and there have been found with undulated or waved leaves, particularly toward the margins, that make the tree a very different looking specimen. Two trees with variegated leaves have been found; one of them is now being propagated.

The following variations of *M. grandiflora* have recently been selected as worthy of description:

'BRONZE BEAUTY'

Leaves elliptic, 6¼ inches (16 cm.) to 9¾ inches (24.5 cm.) long by 3 inches (7.5 cm.) to 4 inches (10 cm.) wide, apices short, blunt pointed, upper surface glossy, laterally convex, midrib and secondary veins depressed, undersurface dull green without tomentum, midrib and veins clearly defined, elevated, base tempered. Leaves as they emerge are well marked dark bronze, a color retained for two or three weeks, contrasting strongly with the dark glossy green of old leaves; tree columnar in part, conical above, well branched down to ground, height 20 feet (6 meters) estimated. Original tree on grounds of Horticultural Department, University of Florida, Gainesville, Florida.

¹ Dr. Hume was formerly Dean of the College of Agriculture and then Provost at the University of Florida, Gainesville, Florida.



Fig. 9. *Magnolia grandiflora* 'St. Mary'

'OCEAN WAVE'

Leaves elliptic, $5\frac{1}{2}$ inches (14 cm.) to $6\frac{1}{4}$ inches (15.5 cm.) long by $2\frac{1}{8}$ inches (5.5 cm.) to $2\frac{3}{4}$ inches (7 cm.) wide, upper surface dark green, glossy, undulate or waved particularly toward the margins, midrib well defined, quite slender in upper part, lateral veins fine, under-surface tomentose, brown, apices tapered, blunt with slight twist, bases usually oblique, petioles short. The waved leaves, all of nearly the same size give this magnolia a very distinct appearance. The original was an old tree on the campus of the University of Florida. It was cut down to make way for a building in which the Hume Library is located.

'ST. MARY'

Leaves obovate or elliptic, $6\frac{1}{4}$ inches (16 cm.) to 10 inches (25.5 cm.) long by $2\frac{3}{8}$ inches (6.0 cm.) to 4 inches (10 cm.) wide, lustrous above, tomentose beneath, medium rust colored, midrib and lateral veins depressed above, elevated beneath, clearly defined, base tapered to blunt attachment with petiole; tree conical in outline, well foliated; flowers cupped, of medium size about 5 inches across on first day of opening. (Fig. 9)²

² Cover illustration and Fig. 9 courtesy of J. Horace McFarland, Co., Harrisburg, Pa.

'St. Mary' was purchased as a seedling, one season's growth, from Joseph Vestal & Son, Little Rock, Arkansas, by the Glen Saint Mary Nurseries about 1905 and planted at Glen Saint Mary, Florida, where it is still growing. It is now about 55 feet high (estimated) with a trunk diameter of 21 inches (measured) at $4\frac{1}{2}$ feet from the ground. It was selected and propagation began by grafting on seedling *M. grandiflora* stocks about 1910. At first it was not named. W. B. Clarke & Co., San Jose, California, obtained two trees in 1939 and scions at a later date from Glen Saint Mary Nurseries, propagated and, in their catalog for 1940-41, named it St. Mary. They were the first to publish the name.

'SUNSET'

Leaves elliptic, blades $4\frac{1}{2}$ inches (11.5 cm.) to $8\frac{1}{2}$ inches (21.5 cm.) long by $1\frac{7}{8}$ inches (4.6 cm.) to $3\frac{3}{4}$ inches (9.5 cm.) wide; apices tapered blunt, bases tapered to petioles, upper surfaces variegated, splashed with light yellow, undersurfaces tomentose, yellowish green, midrib elevated, well defined, lateral veins fine, clearly marked, bases blunt. Original tree found as a small seedling in woods of Glen Saint Mary Nurseries, Glen Saint Mary, Florida, and transplanted to open ground — now (1961) about 8 feet high (estimated). Branchlets with over all green leaves sometimes develop.

International Registration of Plant Names

JOHN M. FOGG, JR.

The preceding issue of this Bulletin contained a discussion of the recently accepted distinction between botanical and horticultural varieties of plants and emphasized the advantages to be derived from the universal application of the term "cultivar" to the latter group.¹

In the same article reference was made to the prodigious numbers of varietal names which have been bestowed upon our familiar garden plants, such as roses, lilacs, ivies, azaleas, maples, hollies, crab-apples, cherries, peonies and many more. The account also described briefly the provisions of the International Code of Nomenclature for Cultivated Plants which have recently been adopted for the express purpose of achieving a precise and stable set of principles for the naming of plants which are important in agriculture, forestry and horticulture.

It is obvious that the task of determining the correct cultivar names for many thousands of plants is one of great magnitude and that its completion will require the services of a considerable corps of specialists over a period of several years. The undertaking calls for a high degree of international coordination and the willingness on the part of the individual collaborator to devote many hours of intensive and painstaking research to his assignment.

Even before the proposals of the International Code of Nomenclature for Cultivated Plants were officially endorsed in 1958, it had become apparent that some machinery should be set up for the international registration of cultivar names. In this country the Committee on Nomenclature and Plant Name Registration of the American Association of Nurserymen published a pamphlet entitled, "How to name a New Plant." Herein it was stated, "The registration [of new plants] should be made with or through the national society devoted to the genus or group involved. For example, a rose should be registered with the American Rose Society, a peony with the American Peony Society. For genera not represented by any society, among woody plants, the registration should be made with the American Association of Nurserymen."

In July, 1956, there took place at Los Angeles a joint meeting between representatives of the American Association of Nurserymen and the American Association of Botanical Gardens and

Arboretums.² At this conference it was agreed to submit the problem of testing and registering plants to the member organizations.

At a meeting of the A.A.B.G.A. held in Philadelphia in August 1957, it was proposed that that organization should accept the sponsorship of an agency to accomplish the registration of new woody plants.

In April, 1959, representatives of the two above-named organizations met with members of the American Horticultural Council in response to a request from the Arnold Arboretum of Harvard University that it be authorized to proceed with woody plant registration.

Subsequently the A.A.B.G.A. was designated by the American Horticultural Council to act as the National Registration Authority for cultivar names of these genera of ornamental woody plants not currently registered by any other society, i.e., *Camellia*, *Fuchsia*, *Hibiscus*, *Ilex*, *Rosa*, *Rhododendron*.

At its annual meeting held in Rochester, N. Y., in October, 1959, the A.A.B.G.A. adopted a resolution that the Arnold Arboretum be designated a National Registration Center for ornamental woody plants for a two-year period from the date of the meeting October 10, 1959.

In March, 1960, Dr. Donald Wyman, Horticulturist of the Arnold Arboretum and Chairman of the newly appointed A.A.B.G.A. Committee on Plant Registration sent a letter to potential registrars soliciting their cooperation in the preparation of international lists of names and inviting them to be the recipients of cultivar names proposed in the United States for registration purposes.

It is obvious that before any specialist can validate a newly proposed cultivar he must be able to check it against a list of all previously published names in a particular genus.

Recognizing the nature and magnitude of this undertaking, Dr. Wyman's letter of invitation sounded the following warning:

"Such an international list is essential before one can act officially as a Registrar, i.e., all the cultivars of the genus which have been used in the past and present must be listed.

"Making such a list means that you may have to go back in the literature to Philip Miller's *Gardener's Dictionary* (1752) and check through

¹ Cultivar versus Variety. John M. Fogg, Jr., *Morris Arboretum Bulletin*, Vol. 12:7-8, 1961.

² For an account of the History of the American Association of Botanical Gardens and Arboretums see *Morris Arboretum Bulletin* Vol. 11:64-66, 1960.

many publications such as Index Kewensis, The Kew Hand List, Rehder's Bibliography, Proceedings of the Royal Horticultural Society and various French, German, Dutch and American periodicals and publications, as well as the historic files of nursery catalogs now at such places as the Bailey Hortorium or the Massachusetts Horticultural Society and the Plant Buyer's Guide. It is also a responsibility to write around Europe in an attempt to locate other lists which may not turn up in the literature.

"A good example to follow would be the International Rhododendron Register compiled by H. R. Fletcher and published by the Royal Horticultural Society in 1958."

The response to Dr. Wyman's letter, which was published in the A.A.B.G.A. Newsletter for October, 1960, has been gratifying. To date lists have been published in *Arnoldia* for *Gleditsia*, *Cornus*, *Pieris* and *Forsythia*. Copies of these, in leaflet form, may be obtained at cost from the Arnold Arboretum, Jamaica Plain 30, Massachusetts.

Also in preparation at the Arnold Arboretum are the following genera: *Fagus*, *Ulmus*, *Fothergilla*, *Deutzia*, *Philadelphus*, *Chaenomeles*, *Exochorda*, *Malus*, *Potentilla*, *Prunus*, *Spiraea*, *Cytisus*, *Robinia*, *Acer*, *Tilia*, *Buxus*, *Elaeagnus*, *Euonymus*, *Ligustrum*, *Lonicera* and *Weigela*.

In addition, specialists in other institutions have accepted responsibility for the registration of the following groups:

Dr. L. C. Chadwick, Ohio State University.
Taxus.

Dr. Donald R. Egolf, National Arboretum.
Pyracantha, *Lagerstroemia*, *Caryopteris*,
Vitex, *Viburnum*.

Dr. John M. Fogg, Jr., Morris Arboretum.
Magnolia.

Mr. Sylvester G. March, National Arboretum.
Clematis.

Dr. Elizabeth McClintock, California Academy of Arts & Sciences.

Hydrangea, *Leptospermum*.

Dr. Philip A. Munz, Rancho Santa Ana Botanical Garden.

Garrya, *Dendromecon*, *Romneya*, *Fremon-
tia*, *Ceanothus*, *Arctostaphylos*.

Mr. George H. Spalding, Los Angeles State and County Arboretum.

Myrtaceae.

Dr. John C. Wister, Arthur H. Scott Arboretum.

Syringa.

Persons having information concerning new cultivars in these genera should send it to the above individuals and no cultivar should be accepted in commerce until properly registered.

It should be further noted that registration of a cultivar does not imply evaluation. Once it has been determined that a proposed cultivar name has not been previously used the plant will be automatically registered, subject only to those provisions which govern the proper form of the name.

New Associates

The Arboretum is happy to welcome the following new Associates who have enrolled since March, 1961:

Mrs. L. C. Bosler, Jr.,

Mrs. Lillian Smale Bradley

Mr. W. O. Bradley

Mr. and Mrs. Gordon H. Chambers

Mr. J. N. Childs

Mr. Leslie N. Foster

Mr. John S. Haug

Mr. W. Wilson Heinitch

Mrs. Philip C. Pendleton

Mr. Arthur Poley

Mr. Lee M. Raden

Mrs. Helen M. Roback

Mrs. A. O. Schaefer

Mrs. Tatiana E. Zell

Magnolia Notes from Rochester

BERNARD HARKNESS¹

Validation as a cultivar name of 'Highland Park' has been requested by Dr. Fogg for a plant of perhaps minor interest to collectors of the *Magnolia Soulangeana* hybrids. It has received at least quasi-recognition in the Second Edition of Dr. John Wister's mimeographed Swarthmore Plant Notes (1942) where the number 2636 is added to it, this being the field number. The same plant is in the Arnold Arboretum where it bears the number 885. This is apparently the number assigned to a seedling here, whether by Mr. Slavin or by Mr. Dunbar, the records do not say.

Magnolia Soulangeana cv. 'Highland Park' has the typical multi-stemmed *Soulangeana* habit but it falls short in height by one-third in comparison with typical mature plants of other clones. Flowering is annual and profuse. Flowers are cup-shaped, the segments measuring $2\frac{1}{2} \times 2\frac{1}{2}$ inches. An occasional branch is so heavily set

¹ Mr. Harkness is Taxonomist, Division of Parks and Recreation, Rochester, New York.

with buds that petal size is reduced to $1\frac{1}{2} \times 1\frac{1}{4}$ inches. The darkest coloring of the outside of the flower segments is 10 P 6/9 (Nickerson Fan); mostly this coloring is strong at the base and dilute toward the tip, the interior of the flower is uniformly ivory-white. There is a pleasant fragrance to the flower. Flowering is with the earlier group of *Soulangeana* varieties.

MAGNOLIA SLAVINII REDUCED TO SYNONYMY

After *Magnolia Slavinii* was first described (Nat. Hort. Mag. 33:118, 1954) as a hybrid of *M. salicifolia* \times *M. Soulangeana*, it was pointed out by Mr. J. E. Dandy of the British Museum (Natural History) that a chromosome count would accurately determine the validity of this assumed cross. Dr. John Einset of the Geneva (New York) State Agricultural Experiment Station made such studies of root tips of a rooted cutting, finding the plant to be a diploid ($2n = 38$). It seems best to reassign the cultivar 'Slavin's Snowy', to *Magnolia Proctoriana* Rehd., thereby considering the parent Anise-leaved *Magnolia* to have been fertilized by some member of the subgenus *Buergeria*.

Aboretum Activities

(Continued from Page 14)

SPRUCE HYBRIDS

The Arboretum has recently received, through the generosity of the Northeast Forest Experiment Station, a valuable collection of three-year old hybrid Spruces.

These young plants are the product of a series of control-pollinated crosses made from known parentages by members of the Experiment Station staff either here at the Arboretum or elsewhere in the Philadelphia area.

Eleven species of *Picea* are involved in the parentage of these hybrids and 67 different progenies are the result. Since, in most cases, we have received three specimens of each cross, there are now in our nursery some 200 individual examples of this interesting series of hybridizations. Another complete set of specimens is being tested under forest conditions in Maine. It is hoped that at some future time it will be possible to report here on the comparative behaviors of these two sets of hybrids.

SPRING PLANTING

As was mentioned in our issue for December, 1960, fall planting was carried forward at a lively pace thanks to mild weather conditions which prevailed throughout October and November. Early in December, however, freezing temperatures set in and continued during the remainder of that month and, indeed, most of the succeeding months until Spring. The result was that fall planting came to a standstill with large numbers of plants still awaiting removal to their permanent sites. Although the advent of Spring was somewhat tardy, there was still time to resume our outplanting program during late April and early May. The result has been that we are about where we should have been last December and can at least face a new growing season with the feeling of not having fallen too far behind.

J. M. F., JR.

Notes on Ornamental Horticulture in Western Turkey

MARY O. MILTON

In the Autumn of 1960 I had the opportunity of traveling through the western tip of the Black Sea region, down the Aegean coast to Izmir, east on the Anatolian plateau to Isparta and Konya, and north past Turkey's Salt Lake to Ankara. This represents only the western third of Turkey, which is a large country and seems even more spacious because of its wide areas of treeless lands, its mountains and its tremendous coastline.

Turkey may be divided into five major geographical areas: the Black Sea region to the north, the Aegean Sea area on the western coast, the Mediterranean coast of Southern Turkey, the vast mountain and steppe lands in the east where Turkey borders Russia and Iran, and the Anatolian Plateau with altitudes which range from 1500 to 3000 feet. This geographic diversity produces widely dissimilar climates which in turn determine to a great extent the existence of ornamental horticulture. As temperature and rainfall vary so does the native vegetation as well as horticultural practice.

My primary interest was in seeing the methods of growing woody ornamental plants. I was most favorably impressed by the interest in horticulture, the variety of species grown, and the very cordial and gracious reception extended to me by people working in this field.

THE ANATOLIAN PLATEAU

While the climate along the Aegean coast is conducive to plant growth, ornamental horticulture in Ankara on the Anatolian Plateau must be coaxed and persuaded to exist at all. (Fig. 10). Ankara lies at an altitude of 3000 feet and is hot and very dry in summer and cold with moderate snowfall in winter. The city itself has wide boulevards lined with young plantings of Chestnuts, Sophora, Flowering Cherry, and Oriental Plane trees. Most of Ankara appears to be a new city with many new apartment and office buildings. New streets and parks are landscaped as soon as construction is completed. The private gardens are rather uniformly planted with *Ligustrum*, *Kerria*, Lilac, *Euonymus*, Roses, and various species of apple, peach, cherry, and pear grown for their fruit. In addition there is usually a small vegetable garden. Annuals, perennials, and tulips which

are native to Turkey, are used in almost every private garden.

The street and highway plantings are done with exacting care. The cultural procedures are similar to those used in the United States with the exception of the method and amount of watering. All lawns, flower beds, trees, and shrubs are watered throughout the summer and fall. Well established trees and shrubs must very often be supplied additional water.

The highway plantings are watered by tank truck. Dishes often 12 to 15 inches deep are dug around the newly planted trees to facilitate



Fig. 10. The Anatolian Plateau north of Ankara

watering. Many trees are fenced in to prevent sheep, goats, and donkeys from eating the leaves and twigs, and since a great many sheep are driven to market by shepherds this fencing is often found quite close to the city.

The area around Ankara is kept treeless and nearly devoid of vegetation due to the lack of rainfall and the incessant grazing. It is difficult to realize that this plateau once supported dense forests. Actually, heavy forests were reported in the Ankara area until the end of the seventeenth century, at which time the exploitation of forests and increased numbers of sheep and goats, which now number many millions, reduced the land to its present condition.

Ataturk Orman Farms exist on some 25,000 acres just outside the city of Ankara. The Farms,



Fig. 11. *Pinus Sylvestris* at Ataturk Farms, Ankara

established by Kemal Ataturk in the 1920's, and now under the direction of the Ministry of Agriculture, include ornamental plant nurseries, vineyards, forests, parks, a zoo, dairies, pasturelands, wineries, a brewery, restaurants, and public recreational facilities. When one compares these accomplishments with the surrounding area the Farms stand as a monument to the dedication of people determined to succeed where nature works so diligently against them.

Many years have been spent in attempting to establish forests at the Farms. Thousands of pines (Fig. 11) now replace the Robinias found not to tolerate the Ankara soil and climate. The parks and gardens are pleasantly landscaped, and the swamp which Ataturk found in 1925 is now a series of walled streams, small gardens, and a large recreational lake.

Mr. Muammer Akalin, nursery and park superintendent, spent an afternoon showing me the nurseries and explaining the methods of maintenance. A great deal of nursery work is necessarily done by hand but modern equipment is available and utilized for plowing and major grading work. Seeding, planting, weeding, and cultivating are done by hand. Watering is accomplished by a series of irrigation ditches. I questioned the source of a white foamy deposit in the irrigation ditches and Mr. Akalin told me that while there were deep wells and pumps supplying thousands of gallons of water to the various areas of the Farms, the source of irrigation water for the ornamental nurseries was waste water from the nearby brewery. This is an indication of the intelligent utilization of water.

The ornamental nurseries consist of trees and shrubs of the hardier variety found growing in our mid-western states; Juniper, *Ligustrum*, *Lonicera*, Roses, and Cotoneaster. A large section of the nursery is given over to the growing

of roses. This includes budding trellises for standard roses. The native Dog Rose (*Rosa Canina*) is used for understock. So far as I was able to determine, most roses are sold by color and habit of growth rather than by varietal name.

Mr. Akalin is attempting to establish ornamental stock plant nurseries for propagating material. At the present time many plants must be imported and the cost and importation regulations are prohibitive. Since Ataturk Farms qualify as an educational establishment the Morris Arboretum has offered to send seeds of ornamentals to be screened for hardiness in the Ankara climate in exchange for seeds of plants native to central Turkey.

Arrangements were made through an interpreter to visit the Horticultural Department of the University of Ankara. We were directed to the office of Doctor Sabintini Ozbek, Chairman of the Department of Economic Horticulture. Although there are few students of ornamental horticulture at the University and even those few have their major curricula in agriculture, Dr. Ozbek and his staff displayed an excellent knowledge of and a great deal of interest in ornamentals.

Dr. Ozbek spoke at length about the problems of plant importation, especially where fruits are concerned. At the present time Turkey does not have the great quantities of pesticides and the means of applying them which are available in the United States, and the introduction of disease can be disastrous to the many small growers in Turkey. He pointed out that he had seen peach and cherry varieties in the United States that he felt would do well in Turkey, but the risk of introducing diseases and insects difficult to control would negate the possible advantage in increased yields. In view of the im-



Fig. 12. Mr. Cemal Koygun, Assistant Director of the Bueykueckdera/Istanbul Research Station. *Magnolia grandiflora* in foreground.



Fig. 13. *Cedrus deodara aurea*

portation restrictions on economic plants a great deal of breeding for hardiness and to develop higher yields is carried on.

Dr. Ozbek arranged an appointment with Dr. Gunel Akdogan, Landscape Architect on the teaching staff of the University of Ankara. Dr. Akdogan spent a day showing me the parks and greenhouses in Ankara. Her knowledge of practical horticulture was surprising and in answer to my comments she explained that in Turkey all students of agriculture or its related fields are introduced to many phases of agriculture and must spend considerable time doing practical work in nurseries and on the farms of the various governmental research stations.

The plant material on the campus of the University is not unusual. A great deal of bedding of annuals, biennials and herbaceous perennials is practiced. The foundation plants are *Cotoneaster*, *Juniperus*, *Thuja*, *Euonymus* and some *Buxus*. The specimen or shade trees are Chestnut, Oriental Plane, Flowering Cherry, Ash, Sophora, and Italian Poplar. A botanical garden for the use of the students is being established on the campus. Native and exotic species will be landscaped into plant families.

THE AEGEAN AREA

Although the variety of plant species in the Ankara areas is necessarily limited by the adverse climate, Istanbul enjoys the moderating effects of the Black and Mediterranean Sea and a most impressive assortment of ornamentals is grown here. The Horticultural Research Station at Bueybuekdere/Istanbul produces a wide variety of plants and, as at Ataturk Farms, these plants, both of ornamental and economic value, are grown for sale to the public and for breeding and research work. Mr. Cemal Koygun, the Assistant Director, very kindly showed me around and explained the work which was in progress. (Fig. 12).

There are a great many plants native to America grown here: the Monterey Pine (*Pinus radiata*), Arizona Cypress (*Cupressus arizonica*), the ornamental silvery-blue pyramidal form (*C. arizonica glauca pyramidalis*), Koster's Blue Spruce (*Picea pungens Kosteriana*), Southern Magnolia (*Magnolia grandiflora*), Eastern Baccharis (*Baccharis halimifolia*), Variegated Box Elder (*Acer Negundo variegatum*), Osage Orange (*Maclura pomifera*), Dogwood (*Cornus florida*), and Redbud (*Cercis canadensis*). American varieties of apples, grown for studies of yield and hardiness and for breeding purposes, include Stark King, Stark Delicious, Golden Delicious, Rome Beauty, and Stayman Redsap.

In addition, there are pears with such exotic varietal names as 'Akca' and 'Mustabey'; peaches with such widely diverse names as 'Dixiered', 'Alberta Giant', 'Bonvicini' and 'Doctor Goekay'. Also growing here are English Walnut (*Juglans regia*), which is not English at all but a native of China; native apricot varieties, (*Prunus Armeniaca*), Almonds (*Prunus Amygdalus*), Pomegranates (*Punica granatum*), and the native Persimmon (*Diospyros Lotus*).

There are many, many plants often seen in our own gardens such as the Silk tree (*Albizia julibrissin*), Weeping Willow (*Salix babylonica*), the oriental species of Sweet Gum (*Liquidambar orientalis*), Chinaberry Tree (*Melia Azedarach*), Ligustrums in variegated, weeping and standard forms; Weeping Ash, Elm, Sophora; Leatherleaf Viburnum (*Viburnum rhytidophyllum*), *V. Tinus*, Crêpe Myrtle (*Lagerstroemia indica*), magnificent Golden Atlas and Golden Deodar Cedars (*Cedrus atlantica aurea* and *C. deodara aurea*), rows of the daintily foliaged *Cotoneaster buxifolia*;



Fig. 14. Garden at Yalova



Fig. 15. Garden at Yalova

Jujube (*Zizyphus jujuba*), and Italian Cypress, (*Cupressus sempervirens*). (Fig. 13). The columnar form, (*C. sempervirens stricta*) is planted in many cities and towns in western Turkey. Also widely used are the very ancient Judas Tree (*Cercis Siliquastrum*), *Rhododendron ponticum* (native to the mountains of Turkey) the Loquat (*Eriobotrya japonica*) and *Raphiolepis ovata* which is perfectly hardy in Istanbul's climate.

There is an area south of Istanbul across the Bay of Izmit that is almost subtropical in climate. Yalova, one of the spas in western Turkey, has an outstanding garden. (Fig. 14). Here one finds meticulously kept borders, topiary, variegated forms of English Holly, *Ligustrum*, *Euonymus* and *Elaeagnus*, and a collection of plant material which includes such widely separated geographical species as Atlas Cedar, evergreen Magnolia, Bananas, and Palms, all of which blend to create an atmosphere of tropical profusion. The plants here are exceptional in the lush growth of the deep green foliage and contrasting vivid splashes of color. The gardens are undoubtedly benefited by the daily watering of the iron and sulfur mineral water, and affected, too, perhaps, by the warm underground springs. (Fig. 15).

South of Yalova near Bursa and Mount Uludag there are beautiful forests of oaks (*Quercus macrolepis*) used in the tanning industry, pines (*Pinus halepensis brutia*) and higher in the mountains, forests of the richly green Aleppo Pine (*P. nigra caramanica*).

Further east and south, through regions of olive groves, vineyards, tobacco and cotton fields, and stands of fig trees, is the beautifully clean subtropical city of Izmir. South and west of Izmir towards Isparta camel caravans laden with produce destined for the international markets of Izmir are a common sight. Dotted along the highways are abandoned camel caravan stations, now occupied by an occasional shepherd. North past Konya, where the delicious rose jelly is made, are miles and miles of wheat fields. Modern trucks and tractors are not an uncommon sight, but oxen and the simple hook-bladed plows in use two thousand years ago are more frequently seen.

Ornamental horticulture on Turkey's western coast is much as we see it along our own south-eastern seaboard, with the exception, of course, of the different plant materials used. There are lovely private gardens, well established parks, and the streets and highways are nicely landscaped. Flower shops and flower vendors are a usual sight. On the Anatolian Plateau however, the use of woody ornamentals is restricted to governmental buildings and the private homes of the more affluent residents. We must keep in mind, however, that the cultural development of central Turkey began just a little over 30 years ago. Prior to that time Ankara was little more than a dusty village. If the progress in ornamental horticulture continues at its present rate, in a few years the young parks, the new street and highway plantings will mature and home landscaping will become more prevalent. But work, time, and indefatigable patience are needed to make nature yield to man. The Turkish people certainly possess the qualities necessary to continue this monumental task.

Associates' Corner

THE OLD MILL

Back in Colonial days numerous mills dotted the banks of the Wissahickon and its tributaries. Run by the power of the stream, they were of many kinds: grist, fulling, oil, saw, and paper mills.

Roads were few and far between in those days and frequently they were impassable in bad weather. Farmers were often forced to bring their produce to be ground on horse back. The mills were gathering places to hear the latest news or to barter and exchange goods with the miller or with their neighbors. The miller was a person of some importance in the community.

Many traditions and stories are associated with the old mills in the Wissahickon Valley. One of these tales concerns a miller named Livezey whose grist mill was situated at the foot of Allen's Lane. It is said that when the British were in Philadelphia Livezey sunk several barrels of home-made wine in his dam, fishing them up again for bottling after the war. One wonders what the wine would taste like today with a nice cap of heady detergent froth.

The old mill at the Arboretum is on the banks of the Wissahickon north of Northwestern Avenue. It was built by William Streepers, Jr. before 1761 as a grist and saw mill. The Streepers were among the oldest settlers in these parts. They took their name from a Willem Streepers who came to Germantown with Francis Daniel Pastorius and whose family was one of the fourteen original settlers.

The Arboretum mill is credited with supplying flour to Lafayette and his troops while they were encamped at Barren Hill. This is entirely possible, for the output of all the mills in the vicinity would have been requisitioned for both armies and it was a matter of which side got there first. Those were rough times for a miller.

When William Streepers, Jr., died in 1783 his widow sold the mill to one of his sons, George by name. In the meantime John Piper, who owned considerable property around Chestnut Hill, had married Hanna Streepers and they purchased our mill in 1789. It became known locally as the Piper Mill and the record states that



Fig. 16. The Old Mill

Piper rebuilt it and probably placed on it the date stone which reads "Springfield Mills 1854."

This could hardly have been the case as Henry Piper was the owner from 1846 and assuming that John was in his twenties when he bought the mill, by 1854 he would have been at least a spry 75. More power to him if he felt like rebuilding with an eye to the future so late in life. It seems more likely that the credit should go to Henry. At any rate, the original building is far older than the present date-stone reading 1854 would indicate.

Henry Piper owned and operated the mill until his death in 1881. After that the idle mill was included in the sale of the surrounding property as it passed through several hands, eventually being acquired by John T. Morris and left, together with the rest of his estate, to his sister Miss Lydia T. Morris, who in turn bequeathed it to the University of Pennsylvania.

The Morrisses repaired the old mill and made of it a picturesque feature of their farm. Its grinding days are over, but in a freshet as the old wheel turns perhaps it is quietly singing of the scenes it has witnessed in by-gone days.

MARION W. RIVINUS

Winter Injury

PATRICIA ALLISON

"Peter Kalm, visiting this country from Sweden, wrote under date of September 23, 1748:

'It is true that in Pennsylvania and even more so in the lands farther to the north, the winters are often as severe as in Sweden, and therefore much colder than in England and the southern countries of Europe. I found, for instance, that in Pennsylvania, which lies by 20 degrees farther south than some provinces of my fatherland, the thermometer of Celsius fell 24 degrees below freezing. And yet I was assured that the winters which I spent there were not of the coldest, but quite ordinary.' "

Was last winter in the Philadelphia area one of the coldest or "quite ordinary?" For an answer, we can search weather records and we can also look about us for lingering evidence. In Pennsylvania, record lows far colder than 11 degrees below zero (24 degrees below freezing, Celsius) are commonplace — everywhere but in Philadelphia, that is. Here, the record minimum just equals Mr. Kalm's reading. The low of the winter past was minus four degrees. Suppose we look about us. At the Arboretum, a Deodar, *Cedrus Deodara*, 42 feet tall, 17.5 inches in diameter a foot above the ground, stands on the hill near Gates Hall. There is a wisp of green at the base, another at the top. It may never again be the splendid specimen it was. Not far from the swan pond, an Incense Cedar, *Libocedrus decurrens*, still is a 23 foot pillar of brown. These are plants that had survived many winters. Elsewhere, *Ligustrum lucidum*, *Prunus Laurocerasus*, *Davidia involucrata*, *Buxus* spp., *Magnolia grandiflora*, *Rhododendron* spp. (azaleas) *Chaenomeles* spp., *Callicarpa* spp., *Pyracantha crenulata*, *Chionanthus retusus*, *Osmanthus ilicifolia*, *Pinus Armandi*, *P. Taeda*, *P. arizonica*, and *P. Pinaster*, have been killed outright or are severely damaged. Was it an ordinary winter? It assuredly was not. So extraordinary was it, in fact, that even the pattern of daily weather at the airport station, where temperatures are often as much as ten degrees different from those in the suburbs, gives us a good picture of just how severe the hardiness test was at the Arboretum.

Before considering the record of Weather Bureau measuring instruments and the records provided by botanical instruments, it might be recalled that many of the commonly reported

types of "winter kill" are not winter kill at all, but fall or spring kill. Woody plants are much like animals in certain respects. One of these is their ability to withstand certain rigors in their environments if the rigors are presented to them gradually. Mice, for example, are better able to withstand continuous cold if they have been subjected to short periods of lowered temperature prior to the prolonged exposure.

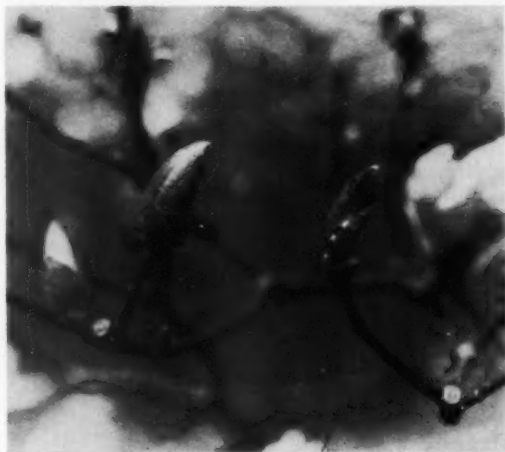


Fig. 17. Flower buds of *Magnolia Soulangeriana amabilis*. Both began to swell, but the one on the right died.

A great many of the mechanisms underlying such preparedness are not yet understood, but the overt results in woody plants are often quite conspicuous. Twigs that, in spring, were delicately pliant, become during summer, increasingly woody. Twig epidermis, once green and tender as that of a young leaf, ensheaths itself in resilient, corky waterproofing. Buds remain sheltered in waterproof scales. The weather-conditioning seems to proceed with astonishing swiftness when deciduous plants lose most of their porous evaporative surfaces, the leaves, in autumn. Similar, though less conspicuous changes occur in evergreens. These profound physical changes come about only because of metabolic changes in the plant. Not all of such metabolic changes are as obvious to us: the lessening of respiratory rate, the slowing of water and mineral utilization, the invisible modifications in living substance that make it less sensitive to cold.

¹ Sauer, Carl O. 1941. The settlement of the humid east. p. 157-166. In *Climate and Man*. Yearbook of Agriculture, U. S. Government Printing Office, Washington, D. C.

There are limits imposed by heredity to the degree of winter preparedness that plants can achieve. This results in what we might term "species hardiness." But because the weather in late summer and autumn is not the same year after year, the success of a given plant in attaining its limit of preparedness, or species hardiness varies from year to year. "Fall winter kill" frequently follows a period of unusually warm, moist weather when winter preparedness is not yet complete. Buds may swell and even elongate into tender shoots. The perfectly normal autumn temperatures following such a period of growth kill the shoots and weaken the plant. No record low was set for the Weather Bureau archives, yet the plant was damaged. Such injury, especially if confined to buds, may become evident only at the beginning of the next growing season. Diagnosis: winter injury.

In the spring the same sort of injury can occur. A few unseasonably warm days inserted in the otherwise gradual transition between winter and spring are sufficient to make some plants relinquish their hold on their winter defenses prematurely. Subsequent normal spring frosts then damage tender tissues that had begun the

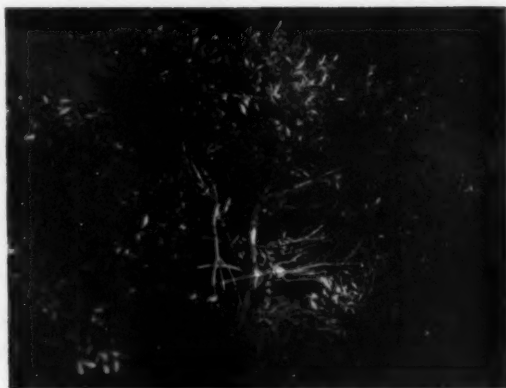


Fig. 19. Winter injury to Boxwood.

long series of alterations that culminate in summer's verdure. Thus, the failure of buds to develop, and the desiccation of broad-leaved evergreen foliage are often attributed to "winter kill."

This year, however, we have seen definite evidence of true winter damage, and no wonder. At least 12 low temperature records were equalled or broken. December was bad enough: the second coldest in 89 years, 11 days with maximums of 32°F or below, 29 days with minimums below freezing. A number of the damaged plants could have been injured then; we do not know for certain. We do know that symptoms were visible shortly after the "fatal fifteen" days of January and February. Beginning with January 19, nearly every conceivable plant-damaging feature of winter occurred.

There were 15 consecutive days with maximum atmospheric temperatures below freezing. The second lowest temperature ever recorded in Philadelphia by the Weather Bureau, minus 4, occurred twice in two weeks. (At the Arboretum, where temperatures were approximately 10 degrees below Weather Bureau measurements, the number of consecutive days of subfreezing weather probably was 21.) During the "fatal fifteen" plants were subjected not only to frigid temperatures, but to drying winds. During the fifteen days there were extended periods of brilliant sun when frozen needles, bark, and twigs could well have reached their thawing temperatures. During the fifteen critical nights, there were frequent starry skies into which the earth's poor warmth fled anew, plunging slender plant parts once again into the frozen state.

Symptoms of winter damage varied not only in severity, but in time of appearance. The leaves of the Deodar began to turn brown during the first week of February. With some Mag-



Fig. 18. Brown-needled *Pinus Armandi*.

nolias, however, the flower buds seemed to swell normally when spring came. Only after many flowers had expanded was it realized that a large proportion of swollen buds had died, and that the injury extended down the twigs an inch or two (Fig. 17). Although there was extensive leaf, bud, and twig mortality among many trees and shrubs, adventitious buds have begun to develop. This is even occurring among some of the pines that were at first considered lost. Whether or not the trees will survive is still unknown. *Pinus Armandi*, among the most seriously damaged, probably will not (Fig. 18). Boxwood suffered extensive damage, but none of the shrubs at the Arboretum was killed (Fig. 19). Characteristic symptoms include the bleaching of leaves and the destruction of bark (Fig. 20).

There are several indirect effects of a severe winter that should be noted. Rabbits fed extensively on bark above the snow (Fig. 21). This sort of injury, of course, is obvious. Less obvious secondary effects may yet occur. Bark can be injured by exposure to the spring and summer sun as a result of the winter thinning of foliage. Limbs so harmed, or already weakened by cold injury, can fall prey to borers and other insects. Dead twigs and branches that are not removed in good time will become the initial substrates for canker and wood decay fungi.



Fig. 20. Ruptured bark of Boxwood.

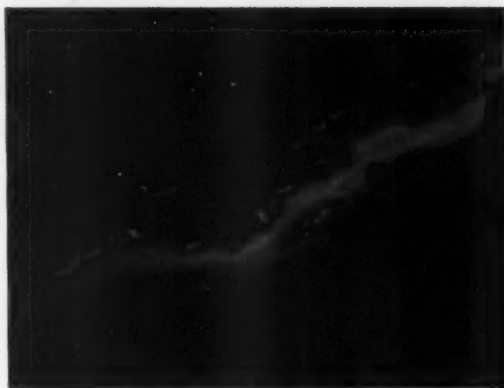


Fig. 21. Rabbit damaged bark of *Magnolia liliflora*.

Although we cannot reverse the weather, we can protect shrubs and trees from further injury by careful pruning, shading, feeding, and timely applications of pesticides. It might be acknowledged also that the total damage would have been much worse had there not been a fine, deep insulating layer of snow that protected roots and low-growing shrubs. And, in the event our spring seemed excessively cool, inordinately overcast, and unobligingly slow in coming, our Swedish chronicler, Mr. Kalm, has words of comfort. "It is also true, however, that if the winters are at times hard, they do not last usually a great while. One can say properly that in Pennsylvania ordinarily they do not endure more than 2 months, and sometimes not that long. It is unusual if winter holds for as much as 3 months. Further, the summer heat is very strong and constant. In Pennsylvania, most of April, all of May, and the following months until October are as warm as June and July in Sweden. Cherries are often ripe in Philadelphia on the 25th of May; and, not infrequently, wheat is harvested in Pennsylvania by the middle of June. All of September and half, if not all of October, constitute the pleasantest season in Pennsylvania."²

² It is only fair to note that May 25 of his calendar would now be June 7.

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